

1 REMARKS

2 Status of the Claims

3 Claims 1-14, 16-24, 26, and 71-77 are now pending in the present application, Claim 15
4 having been previously cancelled by applicants, Claim 25 having been cancelled in the present
5 amendment, Claims 27-70 having been cancelled as being directed to non-elected inventions in
6 response to a previous restriction requirement, and new Claims 75-77 having been added in the
7 present amendment. Applicants have amended Claims 1, 2, 12, 71, and 73, as set forth above, to
8 more clearly define the present invention.

9 Rejection Based on 35 U.S.C. § 112

10 The Examiner has rejected Claim 25 under 35 U.S.C. § 112, second paragraph, as being
11 indefinite. Applicants have cancelled Claim 25, thereby obviating the rejection.

12 Rejection Based on 35 U.S.C. § 103

13 The Examiner has rejected Claims 1, 3-5, 9-14, 18, 20-26, 71, 72, and 74 under
14 35 U.S.C. § 103(a) as being obvious over Bard (U.S. Patent No. 5,580,523) in view of Dewitt et al.
15 (EP. Patent No. 0 796 654) or Agrafiotis et al. (U.S. Patent No. 5,463,564). The Examiner has further
16 rejected Claims 2, 6-8, 16, 17, 19, and 72 under 35 U.S.C. § 103(a) as being obvious over Bard in
17 view of Dewitt or Agrafiotis, and further in view of various other references (including Dugan (U.S.
18 Patent No. 5,658,537)). The Examiner admits that Bard does not disclose the recited reaction
19 database, but indicates that it would have been obvious to incorporate similar databases, as disclosed
20 by Dewitt or Agrafiotis, to achieve an equivalent invention. Applicants have amended independent
21 Claims 1 and 71, which distinguish over the art for the following reasons.

22 Claims 1 and 71 recite a system that includes a reactor comprising a plurality of simple plates,
23 the simple plates being configured such that aligned openings in the plurality of simple plates achieve
24 at least two reactant fluid pathways, at least one mixing volume (Claim 71), at least one reaction
25 volume, and at least one product fluid pathway.

26 Support for stacked plate reactors comprising simple plates like that defined in these claims
27 can be found in the second paragraph of page 15 of the specification as filed (reproduced below),
28 which specifically incorporates by reference a copending and commonly owned patent application,
29 which has issued as U.S. Patent No. 6,537,506, as follows:

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1 Various different configurations of microreactors can be beneficially employed
2 in the present invention. Each microreactor may be designed for only a
3 specific chemical reaction, but will more likely be designed to support the
4 production of a specific class or type of chemical products, since one design
5 configuration is normally useable to produce various chemical products in
6 which the reaction processes are similar in nature. A particularly useful
7 microreactor is described in a commonly assigned co-pending U.S. Patent
8 Application, U.S. Serial No. 09/496,999, entitled "MINIATURIZED
9 REACTION APPARATUS," which was filed February 3, 2000, the
10 specification and drawings of which are hereby specifically incorporated
11 herein by reference. It should also be noted that while in one preferred
12 embodiment, the reactor within reaction module 18 is a microreactor, a
13 non-micro-scale reactor could alternatively be used in conjunction with the
14 present invention. Microreactors are generally characterized as incorporating
15 fluidic structures of less than 1 mm in size, especially with respect to reactant
16 fluid pathways. Thus it should be understood that the present invention is not
17 limited only to modular systems in which reaction modules must include a
18 microreactor, as the reaction module can incorporate a reactor whose fluidic
19 structures are larger in size than the microscale fluidic structures generally
20 associated with microreactors. A reactor with larger scale fluidic structures
21 can be used, as long as the overall size and shape of the reactor is adaptable to
22 fit within the reaction module (page 15, lines 7-26).

16 The use of stacked simple plate reactors are particularly preferred in the modular system of
17 the present invention, because simple plate reactors are readily manufactured, and a variety of
18 different configurations are available, such that stacked plate reactors optimized for specific reactions
19 can be achieved. As the claim structure indicates, reactors in the modular systems defined by
20 applicants' claims are replaceable, such that stacked plate reactor designs optimized for a particular
21 type or class of reactions can be employed in the modular system. When a different reactor design is
22 desired, the previous stacked plate reactor is removed and replaced with a different one.

23 Claims 1 and 71 are distinguishable over the cited art because Bard's chip type reactors are
24 structurally very different than applicants' claimed stacked plate reactors. It should be noted that
25 while Dugan discloses a stacked plate reactor, the cited art does not teach or suggest that Bard's chip
26 type reactors can or ought to be replaced with a different type of reactor. Note that there is no
27 suggestion in the cited art as to any particular advantage to be obtained by employing stacked plate
28 reactors in place of Bard's chip based units, and there is no evidence of any problem recognized in
29 the art that would be solved by including such stacked plate reactors in the modular system disclosed
30 by Bard. There is also no support for concluding that such a modification is simply a matter of

1 engineering design. Simply because Bard states that some modules can be of "different design" does
2 not suggest the *specific* reactor design defined by applicants' claims.

3 Furthermore, the stacked plate reactor disclosed by Dugan is not equivalent to the simple
4 stacked plate reactor defined by applicants in their claims. The reactor defined by applicants in
5 Claims 1 and 71 uses aligned openings in simple plates to achieve reactant pathways, a product
6 pathway, a mixing volume (Claim 71), and a reaction volume. Dugan's reactor defines mixing
7 volumes and reaction volumes using *grooves* that do not penetrate the stacked plates. Applicants'
8 openings are clearly described as penetrating each simple plate. The cited art does not teach or
9 suggest modifying Dugan's reactor to achieve the stacked plate reactor defined by applicants, or
10 using such a reactor in a modular reactor system. Nor do any of the additional references cited by the
11 Examiner appear to teach or suggest an equivalent stacked plate reactor.

12 Claims 1 and 71 are distinguishable over the cited art because the cited art does not teach or
13 suggest replacing Bard's chip type reactors with a stacked plate reactor, and the cited art does not
14 teach or suggest an equivalent stacked plate reactor. Because dependent claims must be patentable
15 for at least the same reasons as the claims from which they depend, Claims 2-24, 26, and 72-74 must
16 also be patentable. Accordingly, the rejection of Claims 1, 3-5, 9-14, 18, 20-26, 71, 72, and 74 under
17 35 U.S.C. § 103(a) as being obvious over Bard in view of Dewitt or Agrafiotis, and the rejection of
18 Claims 2, 6-8, 16, 17, 19, and 72 under 35 U.S.C. § 103(a) as being obvious over Bard in view of
19 Dewitt or Agrafiotis, and further in view of various other references (including Dugan), should be
20 withdrawn.

21 With respect to the rejection of Claim 12, the Examiner appears to assert that Bard's reactor
22 includes a housing having a first and second side, each side including a plurality of ports. Yet the
23 Figure cited by the Examiner clearly shows ports 10 and 11 of housing 100 as being disposed on the
24 same side. A structure having a first side including a plurality of ports, *and* a second side including a
25 plurality of ports, is simply not equivalent to a housing having ports on a single side. Further,
26 Claim 12 recites a mounting frame for the reactor. It appears that the Examiner may have construed
27 Bard's assembly board 80 to be a frame; applicants have thus amended Claim 12 to further define the
28 mounting frame as being encompassed by the housing (which is not disclosed by Bard), and being
29 configured to apply a biasing force to the reactor to secure the reactor in position (this biasing force
30 can clearly be seen in applicants' FIGURES 9-11, implemented by springs and hinges). The cited art

1 does not teach or suggest an equivalent mounting frame. For this additional reason, the rejection of
2 Claim 12 should be withdrawn.

3 Patentability of Newly Added Claims

4 Claims 75-77 are fully supported in the specification as filed, and introduce additional
5 distinguishing elements as discussed below. Claim 75 is similar to Claim 1, but omits some detail
6 relating to the control module, and is patentable for the same reasons as Claim 1. Claim 76 defines
7 the simple plate in applicants' preferred simple plate reactor in greater detail (consistent with the
8 disclosure in the aforementioned patent application specifically incorporated by reference). The cited
9 art does not disclose an equivalent simple plate reactor. Claim 77 defines a modular reaction system
10 including a first reaction module comprising a housing, a mounting frame disposed within the
11 housing (the mounting frame being configured to support a reactor), and a replaceable stacked plate
12 reactor supported by the mounting frame (the replaceable reactor comprising a plurality of simple
13 plates, the simple plates being configured such that aligned openings in the plurality of simple plates
14 achieve at least two reactant fluid pathways, at least one mixing volume, at least one reaction volume,
15 and at least one product fluid pathway). The cited art does not teach or suggest a reaction module
16 including an equivalent mounting frame (see FIGURES 9-11 of applicants' specification as filed,
17 which illustrate one embodiment of such a mounting frame), or an equivalent reactor.

18 In consideration of the preceding remarks and the amendments set forth above, it is apparent
19 that all claims in the present invention define a novel and non-obvious invention. Therefore, the
20 Examiner is requested to pass this case to issue at an early date. In the event that any further
21 questions remain, the Examiner is requested to telephone applicants' attorney at the number listed
22 below.

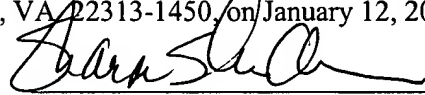
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24 Respectfully submitted,

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